SOIL conservation

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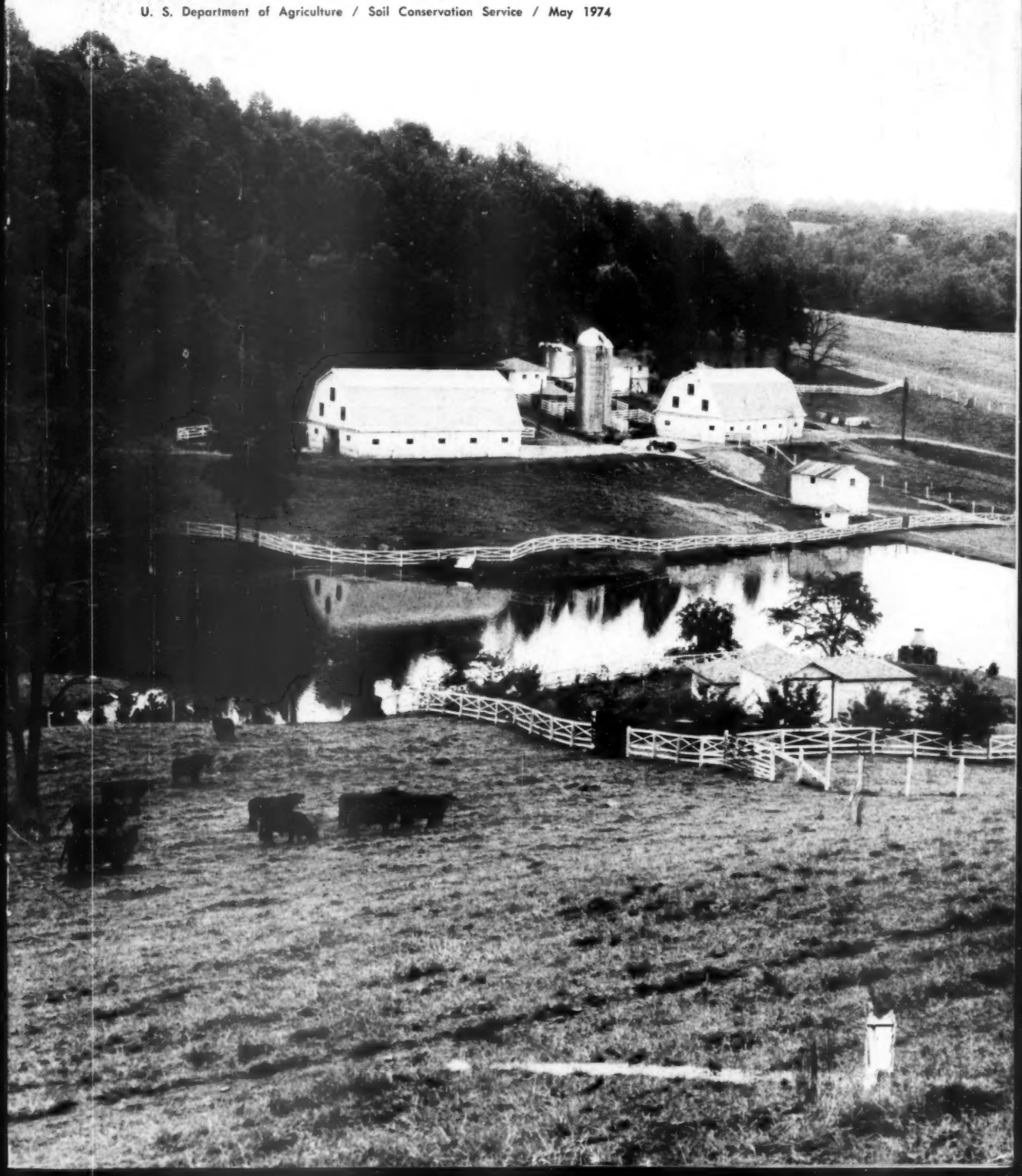

A new plan for water resources

SCS field offices across the nation are being introduced to the new USDA procedures for planning of water and related land resources. The procedures, developed in consultation with the Economic Research Service and the Forest Service, change the planning of watershed projects, river basin studies, and water measures within resource conservation and development projects.

Based upon the principles and standards published by the Water Resources Council on September 10, 1973, these new procedures require specific consideration of two objectives in planning for water resource development—national economic development and environmental quality.

In planning most water resource projects at least three plans will normally be formulated: a plan which optimizes national economic development, a plan which emphasizes the environment, and a "marriage" of the two viewpoints in the third plan. These three plans will be displayed in four "accounts": national economic development, environmental quality, regional development, and social well-being.

By comparing the effects of alternative plans through the display accounts, local decisionmakers, congressional committees, and the general public will be able to see what trade-offs are involved, and to decide on the best plan of action to meet needs in the watershed.

The displays in the four accounts expand the limited monetary display of benefits and costs which have been used in presenting previous plans. Some of the effects will still be displayed monetarily; others, such as environmental and social well-being effects, will be in nonmonetary terms.

This procedure will result in a plan that recognizes the myriad of potential uses of water resources to meet the diverse needs of the general public. Specific objectives of special interest groups will be examined, analyzed, displayed, and the trade-offs presented. SCS planning will increase consideration of nonstructural measures, in harmony with the intent of Congress as expressed in the Water Resources Development Act of 1974.

Sponsoring groups such as county governments and conservation districts will have the responsibility to pull together public input and insure that the final plan reflects the preferred mix of public concerns. Anyone who has an interest in a proposed project—an individual, a state labor department, municipal works board, or private organization such as sportsmen's or environmental groups—will find the information of concern to them. Our aim is to provide the facts, interpretations, and trade-offs that all concerned individuals and groups will need to participate effectively in making the decisions.

The new procedures mean changes for SCS water resource planning. There will still be difficulties to overcome in implementing this new mode of planning. But the concepts are right, and we aim to make them work.

Kenneth E. Grant

SOIL conservation

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COVER: Farmers have built almost two million ponds—including this one in West Virginia.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

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Working with nature in flood plains

by William B. Davey
Deputy Administrator for Water Resources, SCS
Washington, D.C.

Imagine a pristine valley adjoining a stream, acted upon only by natural forces.

Now add Man to that valley.

Being a resourceful opportunist, Man soon began to view these level areas—riverine flood plains—as ideal places to build his homes, stores, factories, and large cities. He proceeded to do so, insuring himself of a good supply of water and a running stream into which to dump his wastes.

The result—as a recent study notes—is that 16 percent of all urban areas in the United States are in flood plains and over 50 percent of flood plains in urban areas are already developed.

Of course, Man had flood problems with flood plains. Yet, historically, he was so convinced of the advantages of flood plain exploitation that instead of moving away when the rains came he looked for ways to reduce their damage.

Man built dams, enlarged channels, and constructed floodwalls, levees, and similar structures for that purpose. Structural protection became the basic flood management policy of the United States until well into the twentieth century.

But "protected" flood plains are even more valuable. So the cycle of man-builds-nature-destroys continued, and flood losses mounted.

A New Look

An adjustment in federal flood control policy began in 1966, when President Lyndon Johnson sent to Congress a task force report (House Document 465) entitled "A Unified National Program for Managing Flood Losses." The President—and the report—urged immediate action to learn more about flood hazards and to apply the knowledge in flood plain management.

Policy changes slowly, especially when it conflicts with long-held values. But since 1966, a number of important changes have occurred in both the public's attitudes toward land use and in official activities in the field of flood plain use. These include:

a) Acceleration of the flood hazard information studies of the Corps of Engineers, the Soil Conservation Service, and other agencies.

b) Publication of the Water Resources Council (WRC) reports, "A Uniform Technique of Developing Flood-Flow Frequencies," and "Proposed Flood Hazard Evaluation Guidelines for Federal Executive Agencies."

c) Presidential Executive Order 11296, under which federal agencies must consider possible flood hazards when locating their installations.

d) Publication of the WRC report, "Regulation of Flood-Hazard Areas to Reduce Flood Losses." This was prepared to assist state and local planning officials as they adopt their own enabling legislation and zoning ordinances.

e) Inauguration of a National Flood Insurance Program in 1968, and

f) A 1973 draft report, by the WRC, on "A Unified National Program for Flood Plain Management."

The Soil Conservation Service is a participating member of the Water Resources Council, and we were—and are—deeply involved in preparation of WRC reports. By the end of 1973, SCS had 66 flood hazard studies underway in 23 states. We are also working on a variety of flood insurance studies financed by the Department of Housing and Urban Development. We have, for example, compiled a list of all 13,500 flood-prone communities in the nation. We are now securing maps of these communities, delineating flood-prone areas in 15 states and Puerto Rico, and working on 155 detailed flood plain studies in 37 states.

Flood Loss Reduction Techniques

Once flood-prone areas have been identified and studied,

A flood plain doing what comes naturally.

the question becomes, how can the federal government and state and local agencies help to reduce flood losses? Speaking very generally, they can:

—Modify the physical impact of flooding—the traditional approach of dams and other structural forms of protection.

—Modify the socioeconomic impact of flooding on individuals and the community through flood insurance, tax adjustments, early warning systems, and post-flood recovery help.

—Modify the area's susceptibility to flood damage by avoiding noncompatible uses. This might involve zoning the flood plain for parkland or other relatively "low risk" uses, or relocating existing buildings.

Cities and rural communities in fully developed flood plains will continue to need flood protection through engineering structures. Relocation or other nonstructural devices are not viable alternatives. But we can look at undeveloped or partially developed flood plains and seriously evaluate their opportunities for nonstructural forms of flood protection.

Application to the Small Watershed Program

How does the Soil Conservation Service apply this in the PL-566 small watershed program?

SCS is taking a closer look at the land, the laws, and the techniques involved in its work.

The erosion control principle of "Keep the raindrop where it falls" is still uppermost in our thinking. Such soil conserving methods as minimum tillage, vegetative cover on the land, terraces, small ponds, and grassed waterways help to slow the force of rainfall runoff, reduce sediment loads, and preserve an area's scenic qualities.

But land treatment alone will seldom reduce serious flooding to tolerable levels. Our next step is to examine the remaining flood hazards and see how they relate to present land use. We discuss this subject in detail with watershed sponsors.

We are now working with local sponsors on a South Carolina watershed project which includes only land treatment and such nonstructural measures as land use regulations consistent with existing legislation. We are, for example, providing natural resource inventory information on the capabilities of the land and suitable future uses. Other states have become interested in this approach, and we expect its popularity to increase.

Structural works will remain a part of many small watershed projects assisted by SCS. There is often no other feasible method to reduce flood losses on prime agricultural land or in developed areas. But SCS is thinking of total land use and water management systems, not flood protection alone, as we help sponsors plan their projects.

Legislation

Existing federal legislation au-

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Looking out for fish in watershed

by Olan W. Dillon *Regional biologist, SCS* *Fort Worth, Texas*

Many people favor flood prevention and more water for farm or community use. Fishing enthusiasts, however, are sometimes concerned when a PL-566 small watershed project changes their local fishing stream. What, ask these sportsmen, will happen to the fish?

What happens depends to a large extent on how carefully fish and wildlife resources—actual and potential—are considered when small watershed projects are being planned. We know that fish habitat can be damaged if proper mitigation or enhancement measures are ignored.

The planning begins by assessing fish and wildlife opportunities on a proposed small watershed site. The fish and wildlife assessment is generally done by a group of biologists from the state game agency, the Bureau of Sports Fisheries and Wildlife, and the Soil Conservation Service.

Armed with this information, biologists and fishermen can work out ways to maintain or improve the habitat for fish.

One of the more obvious ways to minimize habitat damage is excavating a stream from one side of the channel only. In Buck Creek, Upper Blue River Watershed in Indiana, for example, the one-sided excavation left trees and brush on the other bank untouched. The trees shade the stream, provide wildlife habitat, and preserve the beauty of the watercourse.

The Buck Creek project also involved shaping, fencing, and seeding the spoil to reduce sediment formation, while the installation of rock weirs, at about four weirs per mile of stream, mitigated the loss of fish habitat.

The rock weirs create pools that are used by the fish. In 1973, a sampling of the stream showed 8 of the 10 species of fish that were present before the project started were still present. An Indiana Department of Natural Resources biologist believes the other two species will return this year.

In Crow Creek, Alabama and Tennessee, 34 fish habitat development structures, 2 oxbow developments, and a floodway were installed.

The habitat structures are log weirs to mitigate the loss of fish in new channel sections. Six weirs were installed in 1970 to determine their feasibility for smallmouth bass in a cool water stream. In 1973, 28 more weirs were put in. When all planned fish habitat structures are installed in Crow and Little Crow creeks, there will be about 15 structures per mile of new channel.

The floodway, on the Little Crow branch of Crow Creek, was designed to take only floodwater, allowing the low flow of the creek to continue through the old channel. SCS is still educating itself on floodway construction, but this method shows strong promise for preserving natural meanders in streams that have flood problems.

Anadromous fish pose a problem for watershed planners. Salmon and other fish that ascend rivers from the sea require special care and consideration.

In the Skipanon River Watershed Project, Oregon, an 8- by 10-foot door-type flood control gate and several small fish ladders permit silver salmon, searun cutthroat, and steelhead trout to pass upstream to spawning grounds.

In the Central Sonoma Watershed, California, mitigation measures were installed on the Santa Rosa Creek so that adult steelhead trout could pass through about 9 miles of altered channel. A 1,500-foot-long fish pasageway, 4 feet wide by 3 feet deep, allows fish to go through a 14-foot-square box when the creek goes under the city of Santa Rosa. A vertical slot fishway was installed at the junction of a sand trap and a vortex tube. In other parts of the channel, fish resting areas were placed

Chickasha Lake flood prevention structure in Caddo County, Oklahoma, showing principal spillway riser with drawdown gate to permit water level control.

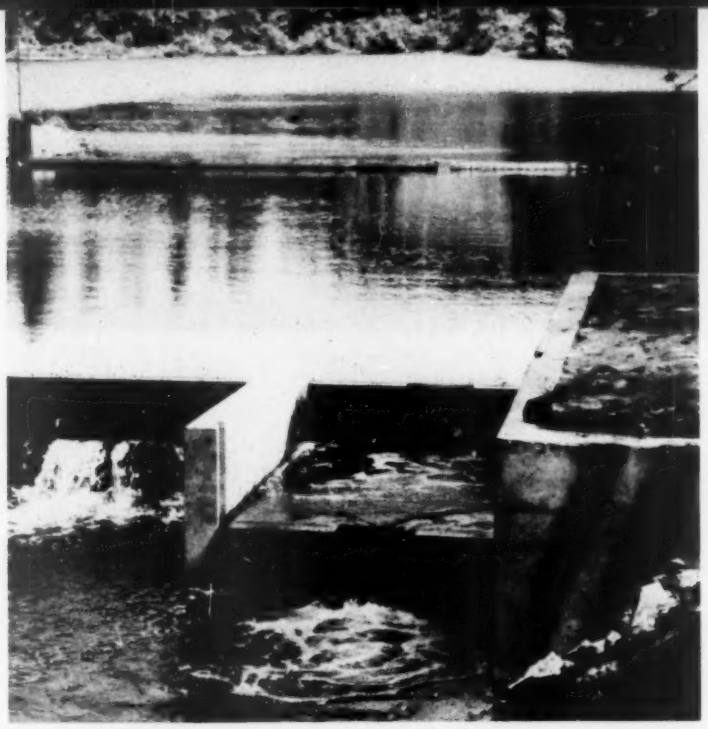
in the channel bottom.

The passage of anadromous and other migratory fish is also accomplished by altering the design of the principal spillway tube. Water depth and velocities then permit the freer passage of fish. In structure No. 8 of the Twin Parks Watershed in Wisconsin, the principal spillway tube was notched to insure a minimum depth of 4 inches of water. The gradient of the tube maintained a velocity of 4 feet per second, allowing trout to pass through the low flow notch.

Tilted rock structures were designed in Beaverdam Creek, Tennessee, to maintain water temperature and allow fish to pass. The structures produced a 3-foot depth of water in place of a wider but much shallower flow. The 3-foot groove was placed as close to the west bank as possible to shade the fish from afternoon sun.

Maintaining the right water temperature in streams or channels is important in creating or preserving fish habitat. Trout are especially susceptible to overheated water. They do best in water between 50° and 65° F. and die at 86° F.

Properly constructed reservoirs provide an opportunity to maintain the right temperature for trout. Bottom water overflows help to do this in several watershed projects. Water near the surface of a reservoir is warmer than the deeper waters below; by removing water from the bottom of the reservoir instead, engineers for the Twin Parks Watershed in Wisconsin can warm the reservoir earlier each spring, benefiting trout who live behind the dam.



210-acre Cullaby Lake in Clatsop County, Oregon, helps control floods and provide recreation. Fish ladder on the right provides passage for migratory fish to upstream spawning habitat.

In the Hightower Creek Watershed Project, Georgia, bottom water overflows were installed in reservoirs to help preserve a marginal trout fishery in the stream below the structures.

Bottom water overflows also draw off oxygen-deficient or toxic waters and thereby increase the living space of fish in reservoirs. Oxygen-deficient waters are aerated as they drop through the primary outlet into a stilling basin before entering the stream below.

Of course, planning for water temperatures provides opportunities as well as problems. Fish habitat could be significantly improved by multiple release openings for regulating the temperature of outflow water — perhaps taking water from the surface of the reservoir in the spring and bottom water in the hot days of August.

Pool diggers were used in the Genegantslet Creek Watershed Project in New York to create pools for trout use. Basically, the pool diggers consist of log structures which force stream flow into the center of the channel and onto an inclined ramp. The stream flows over the ramp and creates a small waterfall. Water pressure from the fall carves out a pool very rapidly. In addition, a riffle area forms around the edges of the pool where the trout can feed at dawn.

continued on next page

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Good engineering methods and advance planning in watershed projects often mitgate or even improve fish life. Our primary interest is in providing a better habitat for people—and that includes looking out for fish. ♦

Our engineers versus their engineers

Sometimes two different teams of engineers—humans and beavers—will work at cross-purposes. This has occurred in some watershed projects. To make an area more livable for people, SCS engineers will install a dam in a creek to prevent flooding. To make the same area more livable for themselves, beavers will install another dam — right on top. All too often the overflow system protecting the human dam is blocked by the beaver dam, endangering both structures during a flood.

However, SCS engineers have come up with something that provides for togetherness—a bottom water overflow system. Beaver "structural works improvement" are crudely constructed of logs, and thus float at or near the surface of the water. This blocks the surface water overflow systems, but bottom water releases are still safe.

With bottom releases the confrontations between our engineers and their engineers can cease.

When Old Man River Raged

by Rose Fleming
Information specialist, SCS
Jackson, Mississippi

Mississippi newsmen, recapping major news stories of 1973, rated last year's spring floods as the top story in the state.

During the 89 days that Mississippi's rivers were at flood stage, damages mounted to $140 million, according to press reports. Over 3 million acres of Mississippi land were inundated. Some 10,000 homes were destroyed or damaged in the Delta section alone, along with statewide damages to agricultural land and property.

Bad as the flooding was, it would have been considerably worse without the flood prevention reservoirs and accompanying soil conservation work done by local people with Soil Conservation Service help.

In Carroll County, flooding was very severe, reaching the 200-year frequency stage. Some 121 SCS-designed reservoirs of varying size held back 100,000 acre-feet of water, protecting the city of Greenwood and the Delta areas of Carroll and LeFlore Counties.

As Travis Taylor, SCS area conservationist at Greenwood, put it, "Without those reservoirs, 177 square miles of Delta land would have been sloshing in another foot of water. Almost all homes and businesses in an 8-mile-wide strip between Greenwood and Bluff Hills—that's 26 miles long—would have had it! As it was, half the buildings in this heavily populated area escaped serious damage."

Flood prevention structures proved to be soundly designed and constructed. Only one of the 121 dams broke—despite the 200-year storm—and the break was so slight the nearby landowner temporarily repaired it himself.

Soil conservation work on the land also helped reduce flood damages. In Carroll County alone, over the past few decades, 62 million trees were planted to help heal old gullies. When the rains came, the trees helped anchor the soil and reduce the amount of sediment load washed downstream.

Throughout Mississippi, in the flood-filled spring of 1973, the story was repeated. In the Askalmore Creek Project, Tallahatchie County, floodwaters filled seven of the eight structures to capacity. Water flowed down emergency spillways, as designed. Peak flood waters were reduced so all downstream channel levees held fast.

Jack Webb, chairman of the Tallahatchie Soil and Water Conservation District, said, "In the past, sediment loads up to 2 or 3 feet would cover our valley after a rain. This almost

wrecked the land for cultivation. But last year our watershed project protected the land and we had little sediment damage."

At New Albany, where almost 10 inches of rain fell in 3 days, parts of the business district flooded for the first time since the Yazoo-Little Tallachatchie project was substantially completed some 19 years ago. Before the project, New Albany regularly flooded several times a year.

A recently completed PL-566 watershed project on Town Creek, in West Point, kept floodwaters within creek banks. West Point's mayor called it "the best buy for the money I've seen in recent years." It is part of the Northeast Resource Conservation and Development Project.

But perhaps the most dramatic story of all occurred in the city of Tupelo.

Tupelo people are wary of floods. The southwestern part of their city suffered more than $695,000 in flood damages from a 1962 storm. Arvie T. Whitenton, president of a local music company, saw floodwaters 8 feet high wash over his business location that year, and at least one factory in the area, with a hundred employees, was destroyed and never reopened.

Because they know about floods, local people cost-shared a PL-566 flood prevention structure on nearby King's Creek which was designed to protect the southwestern edge of Tupelo and surrounding farmlands.

"After the King's Creek structure was substantially finished in July 1971, we could use the area with much more confidence," said Mr. Whitenton. "Today, 4 factories, a large building supply company, and 27 retail businesses are in the immediate area. Their value is in excess of $10 million and they employ hundreds of people."

Hugh Purnell, for example, owns a chicken processing plant in Tupelo that employs 300 people. In the 1962 storm, he was flooded out for 3 days and lost more than $100,000. But in the even more severe flood last year, his plant operated at normal capacity, with no delay and no appreciable water damage.

Construction costs for the King's Creek project were well under $200,000. George McLean, publisher of the Tupelo Journal, estimates that this investment prevented millions of dollars in damages to local businesses. "The financial loss to the Journal alone without this structure would have been $40 to $50 thousand," says McLean.

In 1973, SCS-assisted small watershed projects in Mississippi battled the worst floods of recent years. Designed for 100-year frequency storms, some of them faced even more than that ultimate test. They survived—and helped people and property to survive—as they were planned to do. ♦

Tallahatchie River, Mississippi, during nonflood period.

WHO—local people view project area.

WHAT—outlet in a floor prevention structure.

They're taming a panther

They're taming Panther Creek in northwestern Missouri.

A few years ago, even small rains would cause the Panther to leap its banks, destroy crops, damage roads, and rip out fences. "But that's nearly past history, thanks to the Panther Creek Watershed Project," says Merrill Grant, farmer, of nearby Ridgeway.

Grant's feelings are echoed by his neighbors. Jimmy Osborn, who farms Panther Creek bottomland, says, "A few years ago we were lucky to get corn planted without a flood. Even when the corn got in all right, the crops were often flooded in the fall. But a few years ago, when a 3-inch rain fell, those upstream dams kept us nice and dry."

Better farming conditions are only one benefit. There's also less flood damage to fences and roads. As for wildlife—"Those people who say wildlife are hurt ought to come down here and see what's happened," says Grant. "The fact is, wildlife drown in floods, and raw gullies aren't much of a home for them either. We've got more quail, rabbit, and fish than we ever had before."

Jim Osborn. "The creek would have flooded from hill to hill if the structure hadn't been installed."

Water supplies for people are another plus. Some of Mr. Grant's neighbors hauled water 10 to 20 miles to their homes before the dams were built. Today, several families have their own wells just below a dam.

The Panther Creek project has four completed flood prevention dams, two more that will be finished this year, six major gully control dams, and a number of smaller gully-stoppers. The soils along Panther Creek, developed in glacial till, are highly erosive and gullies develop rapidly unless controlled.

The watershed project isn't all work and no play. Early in the planning for Panther Creek, Ernie Tripp, farmer, insurance

WHY—stabilizing gullies is one reason.

by Robert L. Harryman
RC&D Project Coordinator, SCS

and Dale Mitchell
District conservationist, SCS
Bethany, Missouri

man, and president of the Ridgeway Lions Club, suggested the Lions develop a public recreation area for the town near one of the newly built lakes. Each member of the club was asked to fatten a calf and donate its sale value to the project. The idea became popular and 20 to 25 calves a year were fattened out for the project. The Lions have now leased a 5-acre tract adjoining the largest lake and plan to develop a beach, boatdock, and picnic area.

The Panther Creek project began back in 1956 when Merrill Grant and other local people asked the Soil Conservation Service for help in overcoming flood problems.

Community meetings were held to explain the small watershed program concept of federal cooperation for local projects, and a number of interested citizens toured Kansas and Nebraska to see how other communities were meeting their flood problems. "I remember," says Mr. Grant, "that one group had been able to replace a 60-foot bridge with a dam and a 36-inch pipe."

In 1958 a watershed subdistrict was organized in the Panther Creek area, and the project was on its way. All dams in the project will be completed this year.

What's the secret of carrying out a successful project like this? "A lot of time and work by everyone involved," says Merrill Grant. "We held meetings, we raised money and nine of my neighbors purchased a farm—where the largest lake now is—to get the project started. Most of all, we worked together—everybody did their bit to help us tame the Panther." ♦

A bull's-eye for reclamation

In Nicholas County, W. Va., members of the Wadcutters Gun Club, with Soil Conservation Service assistance, have developed two, 2-acre parcels of surface-mined mountain land into a 4-acre pistol range.

Club members reclaimed the first 2 acres in 1968, and the second adjoining 2-acre site a few years later. Both sites had been stripped of all original vegetation and topsoil, so intensive reclamation efforts were needed.

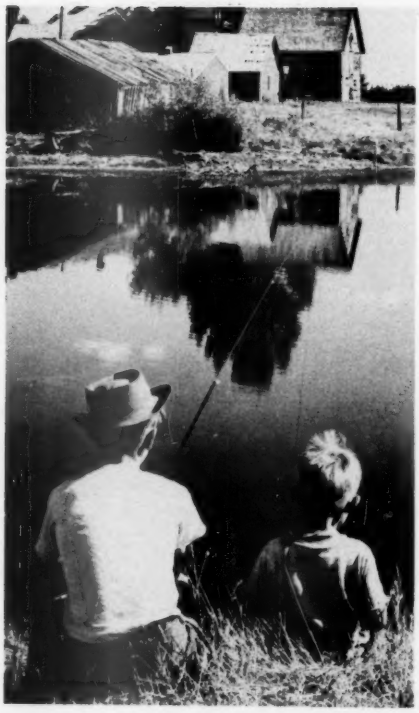
Upon request, SCS made an on-site investigation of the area. Laboratory tests showed the soil, although stripped and rather acidic, would support vegetation fairly well if carefully managed.

After grading and shaping to fill in low spots and smooth the area, club members followed the conservation plan drawn up by SCS. They applied limestone, fertilizer, and the recommended amounts of red top grass seed, tall fescue Kentucky grass seed, and sericea lespedeza legume seed. The lespedeza was put on the remaining rough, steep areas near the highwall and on remnants of outer mine spoil.

The cost of reclaiming the two sites ran to about $450 per acre, but it was well worth it. Club members transformed an otherwise scarred landscape and a source of uncontrolled erosion into an attractive, popular recreation site with modern pistol range facilities.—GEORGE McGRATH, *information specialist, SCS, Washington, D. C.*

Ponds are for . . .

cattle . . .



and kids . . .

and wildlife and conservation

Ponds also are for irrigating crops and growing catfish, and controlling gullies, and holding extra water, and providing flood protection. They are fire protection for farmers, an outdoor nature classroom for schoolchildren, a stop for migratory mallards, a place to swim in water-short areas, and beauty all across the nation's countryside.

Many of the small ponds in rural America have a made-by-nature look. But at least two million of them were, in fact, made by people—farmers, ranchers, other landowners, and small community groups. Besides beauty, recreation, and economic benefits, ponds have various useful ecological functions, such as helping to maintain the water table and providing a safe disposal area for extra surface runoff during rainstorms.

A pond, to be satisfactory, must be well located, well designed, and well built. The Soil Conservation Service helps landowners to select good sites and to design and maintain ponds that will do their intended job. "Building a Pond", USDA Farmers' Bulletin No. 2256, provides more information on—well—building a pond.

More water, less work for Iowa farmer

by Mark Berkland
District conservationist, SCS
Corning, Iowa

When you've hauled water 11 miles every hot summer day for 6 to 8 years, you welcome the chance to stop with open arms.

Homer Minnick, a farmer near Creston, Iowa, stopped the long haul last year. Before that, he sometimes made several trips daily to get water for his hog operation since his own two shallow wells couldn't furnish enough.

Minnick solved the time-consuming, expensive water-hauling chore by building a tile outlet terrace and pond system close to his farm buildings.

His system works like this: three parallel tile outlet terraces collect runoff water from cropland and funnel it through underground tile to a 1½-acre pond. The terraces trap most of the sediment, making the water nearly silt free. The clean water is then pumped 1,200 feet from the pond to the buildings and to the thirsty hogs.

Minnick says it was hard to find a good place for a well in the tight subsoil on his farm.

"And it was costing me about $1,000 a year to haul water. When Joe Knecht, SCS technician, talked to me about a terrace and pond system, I was interested. I didn't think we had a place for the pond, but by taking soil from the pond area to help build the terraces, we made one more than 10 feet deep."

The land earlier had been tiled for hillside seeps. Some of the old tile lines were connected to the new tile lines through the terraces. Together there's enough water to run continuously through the pond, insuring a fresh supply for the animals.

Minnick dug a 24-foot-deep well on the water line of the pond. Water enters the well through a floating filter and is then pumped through an underground 1-inch-plastic pipe to the farm buildings. Electrical wiring for the pump is also underground.

"I haven't had any trouble with the system," says Minnick. "No problem with freezing—it works just as well in winter as in summer."

The entire system including 3,250 feet of terraces, 8 tile intakes, 1,300 feet of tile, and the pond, pump, pipe, and well cost about $6,000.

Besides getting more water, Minnick gets more soil protection. The land can be farmed in continuous row crop "without the soil loss I used to get after a heavy rain." One terrace is built directly above the pond to protect the pond from sediment. The pond will soon be stocked with fish.

The terrace and pond system were planned, along with more terraces, wildlife habitat improvement, and other conservation measures as part of Minnick's overall farm conservation plan. ♦

Homer Minnick inspects tile intake of his terraces.

Arkansas thinks young

by Jack Gibson, president, *Arkansas Association of Conservation Districts, Dermott, Arkansas*

Arkansas soil conservation districts are successfully involving thousands of young men and women in resource conservation work. We find that young people are interested—are eager to learn—and want to be part of the action.

We hope to establish at least one outdoor classroom in each of our 76 conservation districts before school opens this fall. And in what may be our most important youth activity, we are encouraging each district to form a youth board of directors.

Our districts, in addition, carry on a variety of other activities. These include "stream cleanup" events with Boy Scouts; conservation essay contests where as many as 25,000 students have participated; woodland and pasture management contests for high school students; cooperation with vocational agriculture chapters in establishing bluebird trails; wide distribution of Soil Conservation Society of America cartoon booklets; enlarging the "conservation shelf" of many public school libraries; and sponsoring delegates to an annual Youth Conservation Workshop.

One of our earliest outdoor classrooms was established by the Woodland Heights Elementary School at Harrison, with the cosponsorship of the Boone County District. There, youngsters learn how trees grow and what environmental factors promote or restrict their growth, as well as scores of other facts that increase their knowledge of nature.

For many years, the Poteau River Conservation District has sponsored a woodland management contest for high school youth. Students write plans for their timber tracts which outline all practices that are actually needed and set a schedule for application.

A year later, their plots are judged by a panel of professional foresters drawn from the Soil Conservation Service, the Agricultural Extension Service, and the State Forestry Commission. Winners are awarded saving bonds, but more important, each entrant learns a practical lesson in woodland conservation.

The Rich Mountain Conservation District sponsors a similar contest in pasture management. The winner receives a prize, but everyone benefits by learning basic principles of grassland management.

Six districts are working with vocational agriculture chapters to establish bluebird trails. Districts purchase the material, the instructor supervises construction, and houses are sold at cost. In 1973, more than 300 bluebird houses were built and installed.

We are especially proud of our annual Youth Conservation Workshop. Our tenth one—last year—was attended by 94 youngsters, with expenses paid by local districts. Specialists from state and federal agencies donated time as instructors. The youngsters learn about forest ecosystems and the ecology of water-based environments; they learn to make tests for water quality and to manage fish ponds for fun and profit; and they study wetlands and the need for better wildlife conservation. After the week-long workshop, each youngster receives a certificate of completion. More important, each of them returns home with a better understanding of the world around him—or her.

Earlier I referred to district youth board of directors; the Miller, Grant, and West Saline Districts were among the first to start them. The young people have many projects—they help schools with outdoor classrooms, establish grass plots to study new varieties, promote wildlife plantings, and present conservation programs to many groups.

In Arkansas we have a lot of confidence in our young people. We look to them to help solve tomorrow's environmental problems. ♦

David Hartsell, left, and Ronnie Efird, youth board of directors of the Hot Spring District, giving slide talk on pond ecology.

Colorado finds new uses for range site surveys

"My client insists that we restore the 80 acres adjoining his new industrial plant to the original prairie vegetation. What was it and how do we restore it?"

"We're writing an environmental statement. Can you tell us about the natural vegetation?"

"Our school wants an environmental laboratory with natural plant communities. We'd like your help in identifying them."

"The city of Pueblo is short of water. What native plants can we landscape with, so we don't have to do much irrigating?"

These are recent requests for help from the Soil Conservation Service in Colorado.

They reflect the environmental concerns of our society and the growing need for a special kind of information on native range ecosystems.

SCS has this information. We've had it for years—to the surprise of some people—in our range site descriptions. Only, until recently, the information was primarily used by ranchers and other large landowners.

Students at Irving Elementary School in Pueblo, Colorado, study prairie plant community reconstructed from SCS range site description.

In Colorado, 122 range site descriptions cover all of the natural plant ecosystems of the state except for forests, and these are described in SCS woodland site descriptions.

A range site, by SCS definition, is "a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community."

A typical SCS range site description includes information on climate, soils, topography, and the kinds and amounts of plants in the climax plant community.

In addition, most range site descriptions indicate the amount of plant production one can expect in normal and dry years and the location, on the range, where the climax vegetation—or as close to it as possible—may be seen.

An SCS guide for determining range conditions in each site has been prepared. This helps us to evaluate the present vegetation as compared to the climax plant cover for that range site.

What this means to the seeker of information is that we can, for almost every acre in Colorado, tell you not only the highest natural potential plant community of the site, but also in what lower successional stage the community is today.

Since plants and soils de-

by E. F. Sedgley
State resource conservationist, SCS
Denver, Colorado

A range site survey can describe the natural plant community of this land even though its been planted to crops for many years.

velop together, it is entirely possible to determine the best kind of plant cover even if the land has been farmed for many years and there is no longer any native vegetation. If the soil is known, the potential climax vegetation of the site can be accurately described.

We have collected these data over many years by studying "relict" areas which have not been seriously disturbed. To a range conservationist, cemeteries, historic sites, and areas inaccessible to livestock because of topographic features are all excellent sources of information on near-climax plant communities.

SCS also makes long-term observations of vegetative "trends" after an original plant community has been disturbed and later protected. This helps us to determine if the plant community is changing toward its potential or away from it.

Until recently, the terms "rangeland" and "grazing land" have been almost synonymous. But our work on Colorado's 122 different range sites has convinced us there's an important semantic difference. Briefly, rangeland is a *kind* of land—and rangelands vary a great deal—while grazing land describes a major *use* of various kinds of rangeland.

Because range sites vary tremendously in their degree of fragility, or ability to withstand disturbance, a range site description is extremely useful to a land-use planner. That's particularly true in Colorado.

Our state is presently on the threshold of major land use changes. The energy shortage may cause considerably more development of Colorado's vast coal and oil shale reserves. The urbanization of large areas of the scenic Rocky Mountains continues. And Colorado's special combination of scenery, climate, and outdoor recreation opportunities is drawing more and more tourists and Coloradans to our once rural areas.

These land-use changes can mean drastic disturbances in the original biotic ecosystems. Yet—even as people use the land more intensively, they are demanding that environmental values somehow be retained, if possible, and restored if already damaged.

What better tool can those charged with restoration responsibilities have than the knowledge of what kinds of plant communities their particular land can support?

We are discovering that the information SCS has collected over the past 30 years can be used for many other purposes than livestock grazing management. It is really basic ecological information that helps any planner, rural or urban.

If our experience in Colorado is any indication, range site descriptions may well rival soil surveys as a resource inventory tool for good land use planning in the West. ♦

Planned grazing in the beef state

by Vincent Price
Information Division, SCS
Washington, D.C.

The American consumer's demand for more beef has put pressure on both cattlemen and grasslands. Forecasts indicate a sizable increase in the supply of slaughter cattle for 1975 over 1974. One problem facing American cattlemen is how to feed more cattle on the same amount of land.

It's economically impossible to raise cattle solely on feed grains. Breeding herds and young animals must still eat grass. And the amount of American grassland probably cannot be increased by more than 10 percent since pressures from other land uses are too great.

So where will more grass for cattle forage come from? Primarily from current pastures and rangelands which are improved to produce more grass.

Nebraska ranchers are among the leaders in increasing beef production — sometimes 100 percent—by this method.

Nebraska has the double nickname of the Cornhusker State and the Beef State. This is apt since Nebraska's agricultural land is almost evenly divided between cropland in the east and rangeland in the west.

Over the years Nebraska has become one of the top beef producing states in the Union, with approximately 2 million calves a year on 23.9 million acres of range.

In the last decade Nebraska ranchers have increased their production, while providing even better protection to their land, through planned grazing systems. Nebraska now has more than 3 million acres of land under planned grazing systems—about 15 percent of total rangeland in the state. Different systems are used depending on the weather, types of soils and grasses, water supply, and number of cattle.

Basically, a planned grazing system involves dividing a range into two or more pastures (up to nine or more in some areas), and then rotating the herd from pasture to pasture so each area is allowed to "rest" for at least part of the growing season. Resting a pasture allows grass to recover and stimulates better plant growth. Increased forage production in turn permits the same amount of land to support more cattle. The tabulation illustrates some typical Nebraska planned grazing systems.

That a planned grazing system is productive and profitable has been demonstrated again and again.

One Nebraska rancher had 140 cows and 30 replacement heifers on 750 acres of range in 1967, before he made the switch. Today, with his two-pasture planned grazing system, the rancher's 750 acres support 440 cows, 280 calves, and 15 bulls.

A second Nebraska rancher supported 70 cows on 640 acres of land in 1967. By 1970, using a four-pasture system the same land supported 98 cows; by 1972 it supported 108.

A third rancher used a four-pasture system on 2,560 acres of land and increased its grazing capacity by 351 animal unit months (AUM) in 4 years. Using a conservative value of $8 per AUM, the rancher grossed an additional $2,808 a year on his land—more than a dollar an acre.

Nebraska cattlemen report other benefits from the new system. Some say parasite and disease problems are decreased because pastures are cleaner. Others tell of better breeding in a cow-calf program because the herd is confined. Many find that by containing all cattle on part of the land, less travel and labor is required to oversee the livestock. In addition there's greater assurance of grass for winter grazing.

But two benefits of the systems stand out: an increase in forage production and stocking rate, and an improvement in range condition. Nebraska Sandhills ranchers in particular are pleased with the blowout control.

Still, converting to a planned grazing system takes thought, time, and effort. As one Nebraska rancher put it: "Anybody can have good grass by leaving his land idle. Anyone can produce cattle for a short time by overgrazing his pasture. But it takes a good rancher to produce more cattle and better grass on the same land at the same time." ♦

A Two-Pasture Grazing System:

First Year:

	Grazing Periods	
Pasture A	May 1–May 15	May 16–July 1
Pasture B	May 1–May 15	July 2–Sept. 1

Second Year: Periods of grazing are reversed.

A Three-Pasture Grazing System:

First Year:

	Grazing Periods
Pasture A	May 1–July 1
Pasture B	July 2–Sept. 1
Pasture C	Sept. 2–Nov. 1

Second Year: Pastures are grazed in B C A order.

Third Year: Pastures are grazed in C A B order.

A Four-Pasture Grazing System:

First Year:

	Grazing Periods	
Pasture A	May 15–May 18	July 15–Sept. 1
Pasture B	May 19–May 22	Sept. 2–Oct. 1
Pasture C	May 23–May 28	Oct. 2–Nov. 1
Pasture D	May 29–July 14	

Second and Succeeding Years: Pastures are advanced in grazing order each year.

Fishermen's find

"The hottest fishing spot around," according to one local sportsman, "is southeastern Idaho's Montpelier Creek Reservoir."

Built in an area once covered by dry sagebrush, the clear waters of this new lake attract thousands of visitors. And R. R. "Dick" Rowland, president of the local Rainbow Rod and Gun Club, "couldn't be happier" about the added opportunity for local people to fish, boat, and swim in the 4,050-acre-foot reservoir.

The "new fishing hole" is a happy byproduct of a PL-566 small watershed project with the major purposes of preventing floods and providing late season irrigation water. And it's a top performer on those jobs as well. During 1971-1973 the dam and reservoir helped prevent an estimated $360,000 in flood damages and provided an additional 4,170 acre-feet of needed water for irrigation.

The project isn't entirely completed yet. But Idaho's Montpelier Creek Reservoir is already a valued lake for many seasons — and many reasons. James R. Shelton, agricultural economist, SCS, Boise, Idaho.

A NEW POCKET GUIDE

Land Use Planning Assistance available through the U.S. Department of Agriculture, briefly describes the more than 80 programs administered by USDA that assist rural and urban land owners and operators in making major land-use decisions. The illustrated pamphlet summarizes the various programs and lists their land-use applications. The programs offer research, education, and technical and financial assistance.

Working with nature

continued from p.5

thorizes water resource planning agencies to provide more help with structural measures for flood control than for nonstructural measures.

SCS direct authority in this field includes PL-566, the small watershed program legislation enacted in 1954. Over the years, we have been authorized to help provide water supply, recreation, and enhancement of

continued on next page

What?

A volunteer oak, growing out of a Model-T Ford, 1925 vintage, is an oddity that's good for a story anytime.

But the real story is the land underneath — so fertile that even hard metal couldn't discourage an acorn that wanted to grow.

Bob Bobbitt, Rt. 2, Hazelhurst, Mississippi, owns the oak, the Model-T, and the land. His idle field, abandoned for crops more than 35 years ago, is part of some 15,000 acres along the Bayou Pierre that are unused because floods are too severe.

The final chapter has a happy ending, however. A watershed project, cost shared by local people and the Department of Agriculture's Soil Conservation Service, is being planned for the area. Upon completion, this fertile field and others like it will be able to produce more than oddities and abandoned cars. ♦

fish and wildlife values, as well as flood prevention and water management for agriculture.

In 1973, the Rural Development Act included specific language authorizing planning help for "land utilization," in addition to the traditional "water management" concept. With this in mind, SCS strongly encourages local sponsors to include appropriate nonstructural measures, including regulation of land use, in their watershed plans. However, money for buying easements, relocating property, and so on has not been available through PL-566.

Other legislation related to the whole field of flood plain use includes:

1) The Flood Disaster Protection Act of 1973 (PL-93-234). This expands the national flood insurance program and provides for speedup in identification of flood-prone areas. Communities within these areas must establish zoning and building codes that prohibit development on flood-prone land, or else provide adequate protection from 100-year storms. The deadline for enactment is July 1975. After that, no loans for construction work from federally regulated institutions will be allowed. Federal disaster relief also will not be available to nonparticipating areas.

2) The Coastal Zone Management Act (PL-92-583) which provides grants to state agencies for developing coastal zone management programs.

3) The Water Bank Act (PL-91-559) which stresses the protection, preservation, and restoration of wetlands. A program participant develops a 10-year agreement based on a conservation plan. He is paid for preserving, protecting, or improving type III, IV, and V wetlands. This affords an alternative to development of wetlands.

4) The Agriculture and Consumer Protection Act of 1973 (PL-93-86). Title X of this Act authorizes the Secretary of Agriculture to purchase perpetual easements to promote the purposes of the Act, including the sound use of flood plains, shorelands, and aquatic areas. The provision has not been implemented.

5) Land and Water Conservation Fund Act of 1965 (PL-88-578). The nationwide outdoor recreation plan recently prepared by the Bureau of Outdoor Recreation can favorably affect flood plains. The federal government would encourage the use of certain flood plains for recreational use and Land and Water Conservation Fund money could help to buy flood plain lands.

6) Small Wetlands Acquisition Act (PL-87-383). Administered by the Bureau of Sports Fisheries and Wildlife (BSF&W), this helps preserve wildlife habitat through the purchase of easements.

7) Fish and Wildlife Restoration Funds (PL-81-681 and 75-415). These funds, administered by BSF&W, may be used in connection with fish and wildlife activities on flood plains.

8) Federal Water Pollution Control Act Amendments of 1972 (PL-92-500). The planning and standards associated with this Act will have an obvious impact on flood plain use.

9) State and local legislation. The Water Resources Council reports that by 1970 more than 15 states had adopted channel-encroachment statutes or other regulations for flood-hazard areas. The zoning enabling acts of 23 states and the subdivision control acts of 15 states specifically mention flood protection as a basis for their controls. Hundreds of cities and counties have adopted subdivision regulations with flood hazard provisions.

Congress may pass some form of land use planning legislation in the next few years. The Senate has already passed a Land Use Policy and Planning Assistance Act (S. 268) which would provide money to states to develop a land use planning process. Flood plain use would be included.

Finally, there is the recently enacted Water Resources Development Act of 1974 (PL-93-251). Included is a provision directing federal agencies to give full consideration to nonstructural alternatives in planning flood control work on flood plains. It also provides for federal cost sharing when there are viable alternatives to structural protection. To what degree this authority may be used in the small watershed program is now under study.

With some new legislation already on the books, and with other changes pending, the fog is beginning to clear. Perhaps, soon, the full range of opportunities for flood plain management can be more objectively considered and choices made without federal funding exerting an undue amount of influence.

A lot of water has gone over a lot of dams since Man first started figuring out ways to protect himself from floods. The technology for both structural and nonstructural approaches is well developed. The real key to good flood plain management lies in perfecting the institutional arrangements —local, state, or national—for making land use decisions. ♦

Recon . . .

Resource recovery — particularly energy recovery and source-separated wastepaper reclamation — is now second on the list of federal residuals management program priorities, Arsen Darnay, Chief, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, said recently. He emphasized the importance of technical aid but said he does not want the federal government involved in financing construction of resource recovery facilities except for demonstration projects.

Fill 'er up with regular, please. Several nations are examining the possibility of using abandoned mine shafts as handy storage areas for oil. Economics aside, the use of mines would decrease the pressure to build additional above-ground oil storage tanks, which have been attacked by environmentalists as adding to landscape blight. According to *Environment* Magazine, South Africa is using an abandoned coal mine for oil storage; France and Germany are using underground salt deposits for the same purpose; and a British company is looking into a proposal to store oil in an old anhydrite mine. A possible objection to the expedient is that mines were not built to store oil, and leakages could contaminate ground water reserves and play havoc with agricultural and municipal water supplies.

The battle against brush and weeds overrunning Texas rangelands can have long-term effects on the consumer. Research on a portion of rangeland totaling more than 18 million acres in a 117-county area in central and west Texas indicates that certain levels of brush control can dramatically increase beef production. If 50 percent of the brush is killed, the area could produce enough additional beef each year for 1.7 million people. Control of 25 percent of the brush would allow production of additional beef for 854,000 people. The project is one of 49 research efforts described in "Noxious Brush and Weed Control Research Highlights—1973," published by Texas Tech University in cooperation with the Texas Department of Agriculture.

"So you want to be a farmer." Maine's Penobscot Soil and Water Conservation District has tackled the problem of conservation on the farm in a new way. The district has begun holding seminars with young farmers and prospective young farmers in the county. The seminars include an explanation of the importance of proper land use and of the activities and assistance available from the district. On the other hand, the farmers and prospective farmers give their ideas as to what the major resource problems are in the district and what sort of help they're looking for.

A date with LOIS. SCS will make inputs into New Jersey's LOIS system (Land Oriented Information System), an electronic data storage and retrieval computer system. SCS will provide soils maps with interpretations and other resource data. LOIS can retrieve data in tabular or graphic form.

Soil surveys

California and Nevada

Tahoe Basin Area. By John H. Rogers. *1974. Soil Conservation Service and Forest Service in cooperation with University of California Agricultural Experiment Station and the Nevada Agricultural Experiment Station. 84 pp., illus.; maps.*

Georgia

Montgomery, Toombs, and Wheeler Counties. By Herschel L. Paulk. *1973. Soil Conservation Service in cooperation with University of Georgia, College of Agriculture, Agricultural Experiment Stations. 63 pp., illus.; maps.*

Hawaii

Island of Hawaii. By Harry H. Sato, Warren Ikeda, Robert Paeth, Richard Smythe, and Minoru Takehiro, Jr. *1973. Soil Conservation Service in cooperation with University of Hawaii Agricultural Experiment Station. 115 pp., illus.; maps.*

Kentucky

Boone, Campbell, and Kenton Counties. By B. C. Weisenberger, C. W. Dowell, T. R. Leathers, H. B. Odor, and A. J. Richardson. *1973. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 67 pp., illus.; maps.*

Calloway and Marshall Counties. By Maurice E. Humphrey, Frank L. Anderson, Raymond A. Hayes, and John D. Sims. *1973. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 82 pp., illus.; maps.*

New Mexico

Harding County. By Douglas S. Pease, Norman M. Davis, Parker D. Ingram, Paul Shields, Max V. Hodson, Jess C. Epple, Jr., David S. Totah, and Lonnie G. Berglan. *1973. Soil Conservation Service in cooperation with New Mexico Agricultural Experiment Station. 108 pp., illus.; maps.*

Mississippi

Oktibbeha County. By Floyd V. Brent, Jr. *1973. Soil Conservation Service and Forest Service in cooperation with Mississippi Agricultural Experiment Station. 94 pp., illus.; maps.*

Nebraska

Phelps County. By Gilbert A. Bowman, Larry G. Ragon, Charles L. Hammond, Laurence E. Brown, and Rafael A. Boccheciamp. *1973. Soil Conservation Service in cooperation with University of Nebraska, Conservation and Survey Division. 91 pp., illus.; maps.*

Meetings

May

2–3 *California Fertilizer Conference, Anaheim, Calif.*
4–5 *Sierra Club, Los Angeles, Calif.*
5–8 *National Forest Products Association, Washington, D.C.*
6–9 *Southern Forestry Conference, Daytona Beach, Fla.*
8–9 *Fourth Annual American Family Camping Congress, Chicago, Ill.*
11–16 *Fortieth Annual National Planning Conference, Chicago, Ill.*
12–16 *National Council of State Garden Clubs, Inc., Boston, Mass.*
19–26 *Soil Stewardship Week*
20–23 *American Institute of Architects, Washington, D.C.*
26–June 1 *General Federation of Women's Clubs, Minneapolis, Minn.*

June

2–5 *American Institute of Chemical Engineers, Pittsburgh, Pa.*
4–6 *International Exposition and Seminar on Water Resources Instrumentation, Chicago, Ill.*
16–19 *National Watershed Congress, Pittsburgh, Pa.*
16–19 *American Institute of Biological Sciences, Tempe, Ariz.*
16–21 *American Water Works Association, Boston, Mass.*
16–21 *Ecological Society of America, Tempe, Ariz.*
23–26 *American Society of Agricultural Engineers, Stillwater, Okla.*
23–27 *National Environmental Health Association Annual Educational Conference, Cincinnati, Ohio*
24–26 *American Plywood Association, Portland, Oreg.*
24–28 *American Society of Civil Engineers National Symposium on Water Quality Planning, Ithaca, N.Y.*
24–28 *American Society for Testing and Materials, Washington, D.C.*
26–30 *Association of Consulting Foresters, Ocean Shores, Wash.*
28–July 3 *National Education Association, Chicago, Ill.*
29–July 3 *American Seed Trade Association, Inc., St. Paul, Minn.*
30–July 2 *American Society of Farm Managers and Rural Appraisers, Inc., (Summer Meeting), Boise, Idaho*
30–July 4 *American Society of Landscape Architects, Bal Harbour, Fla.*

July

1–2 *National Symposium on Water Resource Problems Related to Mining, Golden, Colo.*
8–17 *Second International Drip Irrigation Congress, San Diego, Calif.*
13–17 *American Association of Nurserymen, Inc., Toronto, Canada*
14–17 *National Association of Counties, Miami, Fla.*
17–19 *Izaak Walton League of America, Huntington, W. Va.*
21–25 *Federation of Business and Professional Women's Clubs, Inc., Chicago, Ill.*
23–25 *National Conference on Flood Plain Management, Washington, D.C.*
25–26 *Great Plains Agricultural Council, Sioux Falls, S. Dak.*

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The subject this month is water—for lawns, livestock, little girls, and many other water users.